The State of the Laboratory
John Marburger
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Brookhaven National Laboratory is a human enterprise whose value depends upon the effort of individual men and women. You would think this is obvious, and yet so often we are seen, and even see each other, not as individuals but as "scientists", "bureaucrats", "technicians", "staff", or as "old-timers" and "newcomers". These are stereotypes – at best half-truths, at worst destructively misleading. Today, after a year of immersion in the Brookhaven experience, I am convinced that the future of the Laboratory depends on our ability to act and grow as individuals, each of us accepting personal responsibility for our share of Brookhaven's magnificent task of discovery. My "state of the Laboratory" report is consequently more like a "state of the people" report. I want to talk about where I think we are in relation to the people whom we serve: our immediate community, our sponsors, and the broader scientific community. And I will talk about three important things we can do to respond to the needs of these communities.

In memoriam

We are never more conscious of the value of individuals than when a colleague is suddenly lost to us. My own consciousness was raised during the year by the deaths of *Joseph Barba, Gertrude Goldhaber, Marie Hicks, Klaus Kinder-Geiger, Young Park, Thomas Savage, Per Spanne, John Tokar,and Alfred Wolf.* Their loss is an admonition not to take for granted the talent each of us contributes to our enterprise.

Caring about our community

Last year *Newsday* helped to educate Long Islanders in the human aspect of the Laboratory. Whatever else you may think of the long articles in *Newsday's* long series, its emphasis on personal views put faces on issues that had acquired an inhuman mythic dimension. A survey we conducted of the community last fall, a contractual requirement, showed that neighbors want to hear about the Laboratory from people who work here. They said personal accounts have more credibility than direct mail reports or newspaper articles. That is why we have worked hard to multiply our personal contacts with people and groups outside the Laboratory. We now have two dozen employees trained as "envoys", each of whom links the Lab with a community organization. During the past year, nearly every time a civic group met in our vicinity a Lab employee was there to listen and answer questions.

People want to hear from me directly, and I give priority to opportunities to speak in the community. But increasingly others are speaking out as well. The community needs to know that I am not the only one who values

this contact. They need to see all employees as approachable, responsible, and responsive to their concerns and questions about the Laboratory. My policy on public statements is that they are made by people with names and faces. Mike Schlender speaks to environmental issues, Mike Bebon speaks to facilities issues. Satoshi Ozaki greets RHIC tours, and Tom Ludlum explains RHIC science to community leaders. The scientist, administrator, security officer, or emergency response expert who is most responsible for an area of laboratory activity is the one who should be speaking to the public about it, either directly or through the media. Many of our senior managers received training last year to help them do this more effectively.

I am also strongly in favor of forums that bring Laboratory representatives together with a cross section of community people. Our own Community Advisory Council got underway last fall, and despite a widely diverse and large membership (more than 30), it has already been the focus of important exchanges. Other active groups include the Brookhaven Environmental Roundtable with regulators and elected officials, and the Suffolk County Legislative committee on BNL. I expect a similar state level group sponsored by Senator Ken LaValle to be more active this year. Far from being problems for the Laboratory, each of these groups permits us to present accurate information in a public forum, usually with news media present.

I want to thank all of you who have helped with these and other activities that bring us into contact with our publics. Just last month RHIC employees helped to conduct an open house that brought 735 people to view the big machine and learn about our hopes for it. Long articles about RHIC in *Newsday* and *Scientific American* appeared at about the same time, creating a public relations momentum that will grow during the year. Attendance at last summer's "Sundays" reached 3,300, recovering from declines in recent years. Even more people, 3,600, attended the Lab's first annual Environmental Day last fall. That event was successful only because a record number of employees from every part of the Laboratory volunteered their time.

Much of our people-to-people contact with neighbors is through planned programs. Our education programs, understaffed by overworked employees, are spectacularly productive: In the past year, 11,000 pupils and teachers have visited the Science Museum, 600 students participated in the Science Fair, 250 in the Maglev contest, another 250 in the bridge contest. 62 teachers honed their math and science skills in a teacher training program. We had 31 Summer Science students, 30 minority high school Summer Apprenticeship students, 26 Community College students, and more. These impressive numbers have earned Brookhaven special recognition from the Department of Energy for leadership in educational programs, despite the very small resources we have been able to invest in them.

Some of our benefits to the community are indirect. Last year we bought $28 million in goods and services from Long Island companies, and of course our 3,000 employees and nearly 4,000 visitors spend their paychecks here as well. But I particularly value the more direct gifts to the community such as the Blood Drives that typically produce more than a thousand pints of blood, our over-the-top United Way campaign that collected $110,000 to support helping agencies, and our food drive which produced 13 tons of food this year for the INTERFACE network. INTERFACE gave us special recognition this year for the quarter million pounds of food the Lab has collected during the past decade. Our employees build houses for Habitat for Humanity, raise money for educational television, volunteer for regional emergency services, school boards, and many other community organizations. Employees ask me how they can help the Laboratory when it seems besieged by criticism. These acts of volunteerism and caring are among the three important things we can do that I mentioned at the outset.

This Laboratory is not at war with its community, and the community is not at war with us. Our neighbors know more about us today than they ever have in the past, and they generally want us to do our work well and safely, without harm to the environment or their health. They want us to succeed, and to add value to their lives. They see us as a resource to the regional economy and to the quality of science education for their children. It is tempting to react with anger to the criticisms we read or hear in news media, but it is wrong to do so. Everyone should realize that the media magnify controversy and negativism. That will always be true. But if we do our jobs well, and maintain open communication with our neighbors, and take their concerns seriously into account as we plan and do our work, then we can count on their respect and appreciation.

Assuring our community

The second important thing we can do is curiously difficult. Not only must we do our work safely, but our community wants assurances that we *will* do it safely. If this point seems subtle, it is nevertheless of the utmost importance. Our regulators, the Department of Energy and the U.S. Environmental Protection Agency, have a simple philosophy that I call a *system of assurance* designed to satisfy the public's expectations. The system asks that we specify how we will do our work, and then do it that way. Any indication that we are not working as we said we would has to be viewed as a breakdown of the system of assurance. That is why our regulators react so strongly to incidents that you may view as "merely procedural violations". Until every employee understands and internalizes this idea of the system of assurance, the Laboratory is at risk of fines, suspension of work, and public outrage. I met with you personally last December in a series of meetings to try to make this point in the specific area of work involving radiation hazards, where excellence in radiation control is a condition of employment, but it applies to all work that potentially threatens environment, safety, or health. Fastidious attention to the system of assurance is the second of the three

important things we must do to regain the confidence of our public.

Strengthening the system of assurance at Brookhaven National Laboratory is a major task. It requires the development of work procedures that comply with all regulations plus common sense. Then the procedures must be made available to everyone who needs them, and they must be kept up to date. Then everyone must receive training in the procedures and how to access them and report ideas for improving them. Then we have to have a way to make sure everyone knows what aspects of the work they are responsible for. And we need a way of checking to make sure we are doing what we said we would do. It sounds like a lot of red tape, but it is the only way anyone knows to give assurance *before the work is done* that it will be done safely. The whole process is called "Integrated Safety Management", and we are required to do it if we want to work with the hazardous equipment and materials we need for our scientific mission.

My philosophy -- I could as well say BSA's philosophy -- is to make the best of Integrated Safety Management. Since we have to do it anyway, let's try to get some benefits from it beyond the immediate objective of assurance. It turns out that the principles of Integrated Safety Management are very similar to general principles that modern organizations have found to be useful for managing anything. Whether you call it "management by objectives", or "performance based management", or "continuous improvement management", the basic steps are the same. Since we must introduce ISM for environmental, safety, and health activities, why not use the basic structure for managing everything we do? That is the basic idea behind so much of last year's management activity. All those "R2A2's", performance measures, self assessment plans, management plans, and the Institutional Plan are activities that have become standard practice in organizations that do complicated, technically oriented work. Every other Department of Energy Laboratory has moved to or is moving toward this kind of management. BNL has been lagging behind the trend, but under the pressure of a demanding new contract, and with the support of our Battelle corporate partner, and our own desire to make it work, we may emerge within another year as a model of modern management.

After a year of time-consuming effort, we are on schedule for implementing the new management systems. I am sorry to say that their benefits will not be very visible for months. From my vantage point, however, I am encouraged by what I see. I want to thank everyone for the effort we made to complete the R2A2 exercise last December, and for widespread participation in work planning and other exercises necessary to make these systems useful. Far from being formal and mechanistic, these systems are exploiting the extraordinary capacity of modern information technology to relate the work we do to the individual men and women who carry it out. I know this works because I have seen it in practice elsewhere. But it takes talented people, and a great deal of persistence, to make it real.

Another Laboratory activity that our community finds reassuring is the cleanup program. My thanks to Mike Schlender and his colleagues for more than meeting expectations to hasten this work. Tremendous progress has been made in during the past year on characterizing the environmental status of the Lab and removing hazardous chemical and radioactive materials. Two big tasks remain. The first is dealing with the legacy of the Brookhaven Graphite Reactor which will take a long time, but initial cleanup steps will be taken during this calendar year. The second is to develop a system for dealing with our waste stream systematically so it never becomes a "legacy" like the BGRR. Within the next two years we are going to be required to pick up the entire cost of dealing with the back end or our waste stream. We can make this job easier by understanding the flow of material throughout the entire Laboratory. That is what the analysis will do that is now being conducted under "Phase II" of a Memorandum of Agreement between DOE and EPA. This impressive project, and also the Environmental Management System being implemented under "Phase III" of the MOA, will give us tools to reduce the amount of waste we produce, accelerating a long trend at BNL of minimizing our impact on the environment as well as reducing costs. Both projects are proceeding well, and on schedule.

Comings and goings

Fortunately, we do have talented people in our administration. Last year I introduced the new management team under the BSA contract. But departures have been eating away at it. Peter Bond, as you know, is spending the year at the President's Office of Science and Technology Policy. He keeps in touch almost hourly by e-mail, and the Laboratory continues to benefit from his insights. Midway through the year Hank Grahn left us for a sunnier climate. Hank's retirement party must have set a new standard for such occasions, and I know many wondered how we would do without him. Today I am pleased to introduce Hank's permanent replacement, Brian Sack, recently Assistant Laboratory Director for Administration at MIT's Lincoln Laboratory. Brian has a Ph.D. in Metallurgy and Materials Science from the University of Pennsylvania, which does not seem to have impaired his effectiveness as an administrator. In the long interim, Greg Ogeka stepped up to the demands of the finance and administration operations, and I am grateful to him for his deep knowledge of the Laboratory and his congenial management style that kept so many important initiatives on track during the past year.

We have also had a long search for a successor to Dick Setlow, whose leadership of the Life Sciences created a strong foundation for growth in this area. I am very pleased to be able to announce today that our own Nora Volkow has agreed to carry the Laboratory into the next stage of development as Dick's successor. No one can be ignorant of the profoundly important work on the origins and treatment of addictive behavior that has focussed attention on Nora and her colleagues Steve Dewey and Joanna Fowler. The Laboratory received unprecedented news coverage

of this work on two different occasions during the year, and I expect even more in the future. I also expect BNL to become a leader in the next step of the exploration of the human genome, which is to understand the structure and function of the proteins coded into DNA. Bill Studier, whose work is crucial to the expression of proteins from DNA segments, is passing leadership of the biology department over to Carl Anderson. Carl's work on the mechanisms our cells use to repair radiation-induced DNA damage is also important to the Laboratory's future in the Life Sciences.

I wish I could say that Hank Grahn and Dick Setlow are the only administrative retirees during the year, but today I must inform you that Adrian Roberts, Associate Laboratory Director for Applied Science and Technology, will also retire effective April 15. Adrian introduced many new ideas in the operation of the Departments of Applied Science and Advanced Technology that will ensure their growth into the future, and also sparked the transformation of the Computer and Communication Division into the Information Technology Division. Adrian has been an important member of our team, and has been an effective advocate and spokesman for the Laboratory in the regional business community. I will miss his insights into these areas, and wish him well as he starts his own business in Oregon. Bob Bari has agreed to pick up Adrian's responsibilities while we search for permanent replacement. Bob's long experience and credibility in the applied science and technology areas are essential to their continued development. This is a good place to note the 17 patents issued, and the 9 Cooperative Research and Development Agreements (CRADA's) initiated since last March. I look forward to increased technology transfer and commercialization in the future, but I know it will be more difficult without Adrian's deep experience in this area.

Adrian's departure coincides with the successful culmination of a search for leadership of information technology at the Laboratory. Ted Daniels has for some time been wanting to spend less time in administration and more in closer contact with his field. His replacement will be Don Fleming, currently Chief Information Officer at EGG, and prior to that CIO of Allied Chemical Corporation. He holds a Ph.D. degree in nuclear physics from Yale, and once did scientific work at BNL. Don's experience and credentials are so impressive that I decided to take advice offered by Ted, Adrian, and others and ask him to report directly to me as Chief Information Officer of Brookhaven National Laboratory. This is a staff position that he will hold simultaneously with the Chairmanship of the Division of Information Technology, which will now report to me independently of the Applied Science and Technology directorate. I am asking Don to prepare a plan for the Laboratory's information technology future, including all aspects of administrative computing, communications, and information management. Speaking of computing, in case you were worried about it, we have achieved Y2K compliance in all our Mission Critical computing systems prior to deadlines and thanks to exceptional

efforts by many people. Tom Sheridan has been keeping me informed of these efforts, and of the unusual pressures brought to bear on the Y2K issue from DOE headquarters. Thanks to all who have responded so well to these.

At the top of the list of other important people who arrived during the year are Secretary Bill Richardson, and our own DOE site manager George Malosh, replacing Dean Helms, whose leave-taking last summer was almost as spectacular as Hank Grahn's. And welcome again to Beth Flores heading up Environmental Services, and our new Laboratory-wide Radiation Control officer Steve Layendecker. I very much regret to announce that Leo DeBobes told me last week that he is returning to Stony Brook after a year of leadership in Safety and Health Services. It was a year of change in this area, and Leo has exerted a strong positive influence there.

Employee matters

Most of our employees, of course, have neither come nor gone during the past year, and they are the ones who are getting the work done. Last year you told us in a detailed survey how you feel about the Laboratory, and where things ought to change. We created four employee focus groups to make recommendations in response to the survey on communications, training, employee involvement, and diversity, and I am about to receive final recommendations from all four groups. Some actions have already been taken, such as the "Monday Memo" e-mail newsletter that starts today, bringing timely information that is not "newsworthy" enough for the Bulletin, but still important. Others will be announced within the coming months.

One of the things I hope the Monday Memo will do is set rumors straight before they get too far out. For example, rumors persist about reductions in employee benefits. Although we are always looking at benefits to see how we can provide them at less expense, there are no plans for major reductions. The Laboratory's Website, renovated last year, has also been an effective source of information for many people inside and outside the Lab. I hope to find ways to keep it even more current.

Rumors are always rampant about the Lab's budget, but I do not have solid information about next year. President Clinton's request for DOE is a little better than flat, but no one expects congress to pass it as is. We do expect a major shift from RHIC construction to RHIC operation, and a major reduction in the High Energy Physics budget. Reductions related to declining RHIC construction at this stage have been expected for a long time, and so has the shift away from AGS. Many service operations are being impacted by these changes as well as by changes begun years ago in the method of charging for services. I have established a Budget Policy Advisory Committee chaired by Tom Kirk and including representatives from program as well as service areas to recommend ways of doing things more rationally and less expensively, if possible. Brian Sack conducted a similar budget review process at Lincoln Lab, and I plan to take advantage of his experience. Meanwhile, the current year is tight, but I expect we will get through

it without serious damage thanks to this year's one-time salary increase deferral for some employees.

Our science mission

My own workday is filled with administrative matters, and I know that too much of yours has been too. But somehow the real work of the Laboratory is getting done, and done very well. I have mentioned addiction research and RHIC, but many other advances could be mentioned as well. One of my favorite experiments, the measurement of the gyromagnetic ratio of the muon (g-2) ran well during the past few months, and I look forward to seeing the results. I am also proud that Bruce Gibbard's leadership of RHIC computing earned high marks on a difficult mock-data challenge, an outcome that not every such program has managed. This and the granting of the Bell Award to the home-built RIKEN/BNL supercomputer have caught the attention of many who thought Brookhaven scientific computing had stagnated. We have targeted Data-Intensive Computing as a Laboratory Initiative about which you will hear more in the coming months. Peter Paul has been working hard with all the Associate Directors on this and the other Initiatives, and important strides have been made in each. Let me remind you that the others are the protein structure determination work I mentioned earlier (The Human Proteome project), the Deep Ultraviolet Free Electron Laser (DUV-FEL), the Environmental Carbon Observatory project (ECO), and the muon collider. Progress is such in each case that I see no reason to abandon any of these as we approach our next annual planning cycle.

As other facility milestones, I might also mention the installation of the LEAF facility in chemistry for fast time resolved studies of electrochemical reactions, and the 300 kev electron microscope in the Applied Science Department. The National Institutes of Health made funds available for new Light Source beamline work for structural biology, NASA has similarly committed to funding a new radiation effects facility at the AGS booster, and congress funded the first phase of the Spallation Neutron Source at Oak Ridge, of which BNL is responsible for a large share of the construction. I see no reason to be pessimistic about the future of the Laboratory with such activity.

There is of course the hanging issue of the High Flux Beam Reactor. Secretary Richardson has delayed the restart decision until late this year, and at this point I cannot guess the outcome. It is increasingly clear that the conditions under which BSA has committed itself to support restart are going to be satisfied: all indications so far are that the reactor can be operated safely and without harm to the environment, and it is certainly needed by the neutron scattering community. It only remains for the Environmental Impact Statement to be released for public comment, and then the decision can be made. Strong statements in opposition to restart have been made by some environmental organizations, but their arguments seem to be based upon an extreme view of the effects of very small additions to background radiation that occur in

normal HFBR operation. I expect vigorous discussion on the issue.

Earlier I listed a number of personnel changes involving administrators. I would also like to announce at this point an exciting appointment in the Physics Department to establish clear leadership for Brookhaven in the field of nuclear physics particularly related to RHIC experiments. While the RIKEN/BNL Institute, led by T.D. Lee, has brought tremendous activity and visibility to RHIC physics, we have needed additional senior theoretical strength in this area. We have found it in Larry McLerran, whose talent was a driver in the creation of the Theoretical Physics Institute at the University of Minnesota, of which he was Director in 1989-92 and now a member and Professor of Physics. Renowned as a world leader in this area of nuclear physics, Larry will bring tremendous experience, energy, and insight to the Laboratory just now at the dawn of a new era of discovery using RHIC.

Brookhaven National Laboratory has been blessed with excellent science from its earliest days. Few people could relate those early triumphs to the people who accomplished them as well as Bob Crease, and I am delighted to announce the publication of the first volume of his history of the Laboratory: "Making Physics", by the University of Chicago Press. A special book signing event will be arranged shortly where copies will be available. (Until then there is always amazon.com.) Bob delights in the personalities of physics, and the first 25 years of BNL personalities are all there, including of course my predecessors Nick Samios and Maurice Goldhaber.

Maurice could well be the symbol of this Laboratory: excellent science, gracefully produced, elegantly presented. He has never fallen out of love with BNL, nor with the thousands of people who worked under his direction for so many years. This year his work will be recognized by the highest award given by the Department of Energy, the Enrico Fermi Award. He richly deserves it.

Last month I attended a ceremony in Washington D.C. where another no less excellent and charming scientific colleague received a different DOE award of great distinction. Joanna Fowler received the E.O. Lawrence Award for her lifetime contributions to the chemistry and applications of compounds incorporating short-lived isotopes to PET imaging studies. Like Maurice Goldhaber, Joanna is a citizen of the entire laboratory, working with groups across departmental boundaries, and helping where she can the broader missions of our community.

I mentioned three important things we could do to respond to the needs of our communities. The first was simply to care about them as people and involve them in our thoughts. The second was to commit ourselves to the system of assurance by which we guarantee that we do no harm to the public or to the environment or to ourselves. The third is to excel, as Maurice and Joanna have, at the work for which this Laboratory exists. Society has given us the tools to forge new knowledge, and looks to us to set

standards of achievement for the nation. I am deeply impressed with how often the people of this Laboratory have risen to these expectations, and I am confident that we will continue to do so in the future.